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THE JOURNAL OF PHILOSOPHY
PSYCHOLOGY AND SCIENTIFIC METHODS

CONSCIOUSNESS AS BEHAVIOR

IN a recent issue of this JOURNAL[1] Dr. Henry Rutgers Marshall has stated very clearly and pointedly certain objections to the view that consciousness is to be interpreted as a form of behavior. Dr. Marshall argues, in substance, that a study of behavior leads normally to sciences like neurology and biochemistry, but not to the "something more" that we call consciousness. We may hold, indeed, that a certain special type of behavior is correlated with consciousness, but when we do so we no longer confine ourselves to the facts of behavior pure and simple. The belief of the observer that this behavior is connected with consciousness is "a matter of inference, and not of objective observation; and it is an inference which involves the metaphysical assumption that certain forms of behavior always have corresponding with them certain changes in consciousness such as he notes in his own experience" (p. 259). The view that consciousness is behavior which is guided by future results is obviously only a special form of the doctrine which Dr. Marshall opposes, and so falls under the same condemnation. If consciousness can not be reached except with the aid of a metaphysical assumption, the case is closed. It can not then be reached "as the result of purely objective observation of the type employed by the behaviorists and other biological students; although Dr. Bode's treatment seems to imply that it can" (p. 261). To identify consciousness with a form of behavior is "as though, having found that a definite form of crystal refracts light in a certain way, one should say that this particular kind of refraction is the definite form of the crystal."

The objection is plausible, and it derives additional weight from Dr. Marshall's eminence in the field of science. Certain parts of his criticism, which are directed more particularly against Professor Watson, need not concern us at present, since Professor Watson is entirely capable of hoeing his own row. My purpose is to comment on Dr. Marshall's objections in connection with the view that con-

[1] Vol. XV., No. 10, p. 258.

sciousness is behavior that is controlled by the future. If I interpret him correctly, he is of the opinion that the "purely objective observation" of our fellowmen would reveal nothing that calls for the use of categories other than those which are used in the physical sciences. We should presumably see them merely as wondrous mechanical contrivances of the sort suggested by James's genial fiction of the "automatic sweetheart," so complete in its verisimilitude as to be "absolutely indistinguishable from a spiritually animated maiden, laughing, talking, blushing, nursing us, and performing all feminine offices as tactfully and sweetly as if a soul were in her."[2]

This illustration of the automatic sweetheart seems to embody quite tangibly the issue raised by Dr. Marshall. A behaviorist who takes his doctrine seriously could doubtless be quite happy with a sweetheart of this sort. But Dr. Marshall would insist, with James's approval, that something highly important was lacking, as would any average person whose appreciations were not stultified by the preconceptions of behaviorism. If such a person should peradventure find himself in the possession of two sweethearts, one being a "spiritually animated maiden" and the other the automatic sweetheart of James's exuberant imagination, he would value the two very differently. It is true that both of them would perform the same offices tactfully and sweetly, as is the manner of sweethearts. Yet in the one case the service would be prompted by solicitude for the comfort and happiness of the beloved, while in the other case the behavior would be merely an indication that this thing of joints and muscles and neurones had been set in motion by a molecular vibration in the nervous system. It would wear its heart on its sleeve, so to speak; the recipient of its ministrations would have full assurance that his sweetheart's witticisms or petulance had no more hidden meaning than the behavior of a phonograph or a cuckoo clock. With the other fair charmer everything would be different. He would be obliged to rely on inference, and his footing would be much less secure. In the one case he would be confronted with problems of mechanics, in the other with problems of diplomacy. It is admitted, of course, that the mechanical problems might have any degree of complexity. Dr. Marshall would doubtless be ready to admit that in the presence of a being so uncertain, coy, and hard to please even his intellectual resources would be painfully inadequate. Yet the fact remains that, in principle, the automatic sweetheart could be understood and explained in mechanical terms as exhaustively as a lemon-squeezer or a cider-press; whereas the other sweetheart would make it necessary to have recourse to a "metaphysical assumption."

[2] *The Meaning of Truth*, p. 189, note.

And while we might marvel at the perfection of a mechanical device that could serve us so acceptably, our deeper emotions would be left untouched, for, as James says, "the outward treatment is valued mainly as an expression, as a manifestation, of the accompanying consciousness."

Yet the behaviorist is constrained to disagree. He finds it difficult to believe that our hero would keep himself constantly reminded that one of his sweethearts ministers to his wants merely *as if* prompted by a concern for his well-being, whereas the other is motivated by a concern that is not simulated but real. Since the outward acts would be the same, this distinction would make it necessary to maintain an attitude of meditation not wholly in keeping with the spirit of courtship, to say nothing of the masculine tendency towards the view that all women are alike. Moreover, if he could be induced to reflect on the nature of the distinction, his reward in all likelihood would be, not a heightened appreciation of its significance, but rather much weariness and vexation of spirit. Since the outward acts are alike, what real ground is there for attributing the conduct of the one to motives and purposes, and that of the other to soulless mechanism? If the acts of the latter are entirely explicable on the basis of mechanism, the same must be true of the other, unless we assume that there is a difference between them which is open to purely objective observation. If there is no difference, then the consciousness of the spiritually animated maiden plainly makes no difference in the behavior; it is a mere concomitant or epiphenomenon. Diplomacy, in that case, is as much out of place with the one as with the other; mechanism becomes the last word of explanation, and the mystery of the eternally feminine takes on much the same quality as the mystery of higher mathematics. Or he might approach the matter from the opposite side and inquire into the reasons why the automatic sweetheart should be denied the attribute of consciousness. Her powers of adaptation are admittedly unique. She is clearly capable of utilizing the results of previous happenings in such a way as to bring about the recurrence or the avoidance of these results, according to the needs of adaptation. What else can be the meaning of her reminder to him that the front steps are covered with ice, or that he had better consult a physician about his cough? The purposive relationship, or control by future results, is suggested at least as directly by observation as is the relationship of the magnetic needle to its pole or the gravitational relationship of the moon to the earth. Yet these latter cases are not supposed to warrant an inference to something occult and metaphysical called "magnetism" or "gravitation." Nor would there be much "sense" in the supposition of a needle that behaved in every ascertainable respect like a

magnetic needle, the only difference being that it had nothing to do with magnetism. To behave in that way is to be a magnetic needle. Is there any antecedent necessity why a purposive relationship, control by the future, should occupy a radically different status from the relationship of magnetism or gravitation?

The plausibility of Dr. Marshall's contention is the result, as I venture to think, of an underlying assumption regarding the relation of observation to hypotheses or interpretation. As Dr. Marshall presents the matter, observation does its work in entire independence of interpretation. We take note of what the body does; and after the facts have thus been secured, the inference to a correlated consciousness is foisted upon them. This is the meaning, I take it, of the statement that the existence of consciousness is "a matter of inference and not of objective observation." The facts are, of course, in no position to protect themselves against this treatment, but they are relieved of all responsibility in the matter by the declaration that the inference rests altogether on a "metaphysical assumption." But if we proceed in this way, we are playing with fire. Why not say in precisely analogous fashion that purely objective observation presents us with a moving outline of dingy white, which, by virtue of metaphysical license, we then interpret as a baseball that is propelled by the force imparted to it from the impact of the bat? In fact we do not first observe and then supply a context, but we observe by seeing things as existing in a certain context. Or, if the statement be preferred, the inferences of earlier situations are the flesh and bone of our present observations. In so far as inference is uncertain, the observation is likewise uncertain. The man who suspects that his sweetheart is out of temper is not indulging in a passion for metaphysics; he is making use of his misgivings as a guide to observation. And similarly the tendency of primitive man to interpret all sorts of occurrences as acts that are done "on purpose" for his weal or woe is not due to an innate fondness for the metaphysics of consciousness, but rather to his poverty of resources in the matter of interpretation. The observation of purposive behavior is the same in kind as any other observation, and is subject to correction by the discovery of facts that suggest alternative explanations, such as gravity, magnetism, reflex action or instinct.

If this be a defensible position, it follows that inquiries into the existence of consciousness must rely on methods of investigation such as are embodied in the procedure of comparative psychology. They do not depend upon neurology or biochemistry, which Dr. Marshall takes as representative of purely objective observation in this field, because these subjects address themselves to other problems, although it is true that their results may lend themselves to a variety of ap-

plications. When the observer construes certain of these results as characteristic of conscious behavior, he is not just supplementing gratuitously a set of facts that are already complete and self-sufficient, but is attempting to interpret these facts in their relation to other facts, *viz.*, the ends that are achieved by conscious behavior. So long as this state of affairs is overlooked, consciousness is able to maintain itself in a state of metaphysical isolation, and the attempts to reduce it to a form of behavior become just the oddities of persons who "glory in their logical shame." But the traditional conception of consciousness has proved its egregious unfitness on so many occasions that it is scarcely in a position to be disdainful of a humbler rival, who fraternizes with science and who can claim no lineage that entitles it to the protection of metaphysics.

B. H. BODE.

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NON-ARISTOTELIAN LOGIC

THE preeminent advantage of the set of categorical forms selected by Aristotle for the construction of his logic is this, that, corresponding to each member of the set, there exists a single other member of the set, which stands for its contradictory.[1] This property is expressed by the following implications,

$$A(ab)\,O(ab) \angle o, \quad i \angle A(ab) + O(ab),$$
$$E(ab)\,I(ab) \angle o, \quad i \angle E(ab) + I(ab).$$

These propositions are fundamental in the classical system, but the two to the left do not remain true when the terms are allowed to assume the special meaning *zero* and *one*, for they become,

$$(a = o,\ b = i), \quad A(oi)\,O(oi) \angle o, \quad E(oi)\,I(oi) \angle o.$$

The two forms here conjoined are, in each instance, true propositions, and can not, therefore, taken together, imply an impossibility.

[1] Such symbols as we shall have to employ are already in common use. We shall represent the four forms of the ordinary logic by $A(ab)$, $E(ab)$, $I(ab)$, and $O(ab)$, the small a in the bracket standing for subject, the small b for predicate. The *null*-class and the *null*-proposition will be represented by o (zero), the *one*-class and the *one*-proposition by i (one), and we shall from time to time replace the a and b by these special symbols. In every case it will be clear from the position of the symbol, whether class or proposition is meant.

For the hypothetical relation, *if, then* (*implies*), we shall employ the symbol, $\angle$. The conjunctive relation, *and*, we shall indicate by the multiplication sign, which, understood in every product, is usually not expressed. The disjunctive relationship, *either, or*, will be represented by the addition sign.

In those instances in which it will be necessary to indicate that a given proposition is false, we shall place a prime ($'$) to the right.

The common logic seems to break down, accordingly, when the terms are allowed to take on these limiting values.

If we turn to the syllogism, the same breakdown that appears in connection with the implications just given, will manifest itself again. Thus the valid mood,

$$A(ab)\,O(cb) \angle O(ca),$$

becomes for $a = c$,

$$A(ab)\,O(ab) \angle O(aa),$$

and this, if we assume as is commonly done, that

$$O(aa) \angle o,$$

since implication is a transitive relation,

$$A(ab)\,O(ab) \angle o,$$

which is the implication that has already been shown to be invalid.

If the subject and predicate of the conclusion be identified in each one of the valid moods of the syllogism which have a negative conclusion, then it will follow, just as above, that each one of these moods is invalid. It was this result which was pointed to in the past as invalidating the common logic. It is our purpose to show in just what sense this view was a misunderstanding and the manner in which this apparent bankruptcy of the ancient scheme of inference may be remedied.

We observe, in the first place, that the implication,

$$O(aa) \angle o,$$

is not forced on us in any way in virtue of

$$i \angle O(oo),$$

for it can be shown that this latter assumption, while it does violence to current logical orthodoxy, is permissible, since there is nothing in the definition of the null-class that can prevent one postulating it.

Under this condition, *viz.*,

$$\{O(aa) \angle o\}',$$

which is implied by the additional result,

$$\{E(aa) \angle o\}',$$

all of the twenty-four moods of the syllogism, which are commonly recognized as valid, remain valid, but the characteristic property of the Aristotelian system (mentioned in the first paragraph) will not have been restored by this device. In order to retain that advantage, we should have to assume

$$O(oi) \angle o,$$

from which it follows that

$$E(oi) \angle o,$$

and the possibility of doing this can be established as before, by demonstrating that there is nothing in the definition of the null-class to prevent our assuming them to hold true.

Such a logic, whose characteristic postulates would be the two just written down, is only one member of a family of logics, whose existence I shall point out later on. It might appropriately be called *semi-Aristotelian,* because exactly the same implications, which are true in the common logic, hold here, and conversely. The classical logic is identical with it, except that the range of application in the former case is commonly restricted so as to exclude *nothing* and *universe* as possible meanings of the terms.

The importance of this result lies not so much in the fact that the old logic is exonerated of the charge that has been made against it in the past, that its hypotheses are impotent to interpret the new meanings which have been introduced into the science since its inception, as in the fact that a new and more general system of inference has been pointed out.

In order to establish the existence of other systems of inference, it will be convenient to employ a set of categorical forms, whose relation to the traditional ones is given by the following equations:

$$\begin{aligned} A(ab) &= \alpha(ab) + \gamma(ab), \\ E(ab) &= \epsilon(ab), \\ I(ab) &= \alpha(ab) + \beta(ab) + \gamma(ab) + \gamma(ba), \\ O(ab) &= \epsilon(ab) + \beta(ab) + \gamma(ba). \end{aligned}$$

Their verbal interpretation is

$$\begin{aligned} \alpha(ab) &= \text{all } a \text{ is all } b, \\ \beta(ab) &= \text{some } a \text{ is some } b, \\ \gamma(ab) &= \text{all } a \text{ is some } b, \\ \epsilon(ab) &= \text{no } a \text{ is } b, \end{aligned}$$

the word *some,* which is explicit in β and γ, being understood to mean *some at least, not all.*

If our universe of application be that one presupposed in the Aristotelian system (*i. e.,* if the terms can not take on the meanings zero and one), it will in turn be possible to express α, β, γ, and ϵ in the members of the set, *A, E, I, O.* Thus,

$$\begin{aligned} \alpha(ab) &= A(ab)\, A(ba), \\ \beta(ab) &= I(ab)\, O(ab)\, O(ba), \\ \gamma(ab) &= A(ab)\, O(ba), \\ \epsilon(ab) &= E(ab). \end{aligned}$$

These are obtained by multiplying out the sums just given, assuming

that the subject and predicate of α, β, and ϵ are simply convertible, and by applying the following implications,

$$\alpha(ab)\,\beta(ab) \angle o, \quad \beta(ab)\,\gamma(ab) \angle o,$$
$$\alpha(ab)\,\gamma(ab) \angle o, \quad \beta(ab)\,\epsilon(ab) \angle o,$$
$$\alpha(ab)\,\epsilon(ab) \angle o, \quad \gamma(ab)\,\epsilon(ab) \angle o,$$
$$\gamma(ab)\,\gamma(ba) \angle o.$$

The latter results are in accord with those of the common logic and with those of the more general logic, which we have already discussed, but no longer hold under the special conditions, which are set down later on. We may indicate in passing, that the implications just given then become,

$$\alpha(ab)\,\beta(ab) \angle o, \quad \{\beta(ab)\,\gamma(ab) \angle o\}',$$
$$\alpha(ab)\,\gamma(ab) \angle o, \quad \beta(ab)\,\epsilon(ab) \angle o,$$
$$\alpha(ab)\,\epsilon(ab) \angle o, \quad \{\gamma(ab)\,\epsilon(ab) \angle o\}',$$
$$\{\gamma(ab)\,\gamma(ba) \angle o\}'.$$

Our task is now to discover what limitations are imposed upon us by the definition of the null-class.[2] This definition is given by the following implications:

I. $$\alpha(io) + \gamma(io) \angle o, \quad \alpha'(oi)\,\gamma'(oi) \angle o,$$

and its immediate consequences are:

$$\alpha(oi) \angle o, \quad \gamma'(oi) \angle o,$$
$$\alpha(io) \angle o, \quad \gamma(io) \angle o.$$

A further restriction, which follows from the definition and has therefore to be taken into account, is $\alpha'(aa)\,\gamma'(aa) \angle o$,[3] or in particular,

II. $$\alpha'(oo)\,\gamma'(oo) \angle o, \quad \alpha'(ii)\,\gamma'(ii) \angle o.$$

Our results, which may be summarized as,

[2] The null-class is defined as the class which is the *contrary* of itself; *i. e.*, if b and non-b are two species, which complete the genus, but which have no object in common, and if further a is a species of non-b, then a is a class contrary to b. The null-class is, then, the class which uniquely satisfies this condition when a and b have been identified.

Employing the usual notation, we should write:

$$o \angle i \quad = o \textit{ is included in } i \textit{ is true},$$
$$(i \angle o)' = i \textit{ is included in } o \textit{ is false}.$$

The first condition implies and is implied by and is hence equivalent to Schröder's *Nullpostulat*. The second is identical with his so-called *Existenzpostulat*. It will be readily seen that the definition which we have given is only another manner of expressing the same thing.

[3] It might, not unnaturally, be supposed that the import of $a \angle a$ would be the same as that of the proposition, all a is all a. But that $\alpha(aa)$ may even be untrue for all meanings of a without making it untrue that $a \angle a$ is easily seen from the form of the implication, $\alpha'(aa)\,\gamma'(aa) \angle o$.

(*a*) $\gamma(oi)$ is a true proposition,
(*b*) $\alpha(oi)$, $\alpha(io)$ and $\gamma(io)$ are false propositions,
(*c*) either $\alpha(oo)$ or $\gamma(oo)$ is a true proposition,
(*d*) either $\alpha(ii)$ or $\gamma(ii)$ is a true proposition,

leave undetermined the truth or falsity of β and ϵ, when subject and predicate are allowed to take on the meanings *zero* and *one* in every possible way, and this rather wide range of choice will evidently enable us to construct a number of systems of inference, the characteristic postulates of which may stand in contradiction to one another. In order to determine unambiguously a single one of these systems it will be natural, by introducing a series of postulates, to remove one possibility after another, until no choice among alternatives remains. These postulates, "self-evident" when the values zero and one are excluded, will then be assumed to hold true in the limiting case. As our illustration of method, we shall determine the system, which appears the most paradoxical to "common sense," the one, namely, which asserts the untruth of the proposition, *all a is all a*, for all meanings of *a*.[4]

We shall assume in the first place that $\alpha(ab)$, $\gamma(ab)$, and the product, $\beta'(ab)\,\epsilon'(ab)$, are convertible by *contraposition, i. e.*, denoting non-a by a',

(1) $$\begin{aligned}\beta'(ab)\,\epsilon'(ab) &\angle \beta'(b'a')\,\epsilon'(b'a'),\\ \alpha(ab) &\angle \alpha(b'a'),\\ \gamma(ab) &\angle \gamma(b'a').\end{aligned}$$

Our other postulates will be:

(2) $$\alpha(ab) \angle \alpha'(ab')\,\gamma'(ab'),$$

which yields $\alpha(oo) \angle o$, for $a=b=o$, by I. Consequently,

$\gamma'(oo) \angle o$, by II.; $\alpha(ii) \angle o$, by (1); $\gamma'(ii) \angle o$, by II or (1);

(3) $$\beta(ab) \angle \alpha'(ab')\,\gamma'(ab'),$$

which yields $\beta(oo) \angle o$, for $a=b=o$, by I; and

$\beta(oi) \angle o, \beta(io) \angle o$, for $a=o, b=i$, by II;

(4) $$\epsilon'(ab) \angle \alpha'(ab')\,\gamma'(ab'),$$

which yields $\epsilon'(oo) \angle o$, for $a=b=o$, by I; and

$\epsilon'(oi) \angle o, \epsilon'(io) \angle o$, for $a=i, b=o$, by II;

(5) $$\alpha'(ab')\,\gamma'(ab') \angle \epsilon'(ab),$$

which yields $\epsilon(ii) \angle o$, for $a=b=i$, by I.

[4] It will be necessary to add to what follows, *viz.*, $\gamma'(oo) \angle o$, $\gamma'(ii) \angle o$, the more general postulate, $\gamma'(aa) \angle o$. Without this postulate it still remains unsettled, whether we intend to deny the truth of *all a is all a*, or to assert its untruth for *all meanings of a*.

The only case which remains unsettled is that of $\beta(ii)$, and it may now be seen from the first member of (1) that $\beta'(ii) \angle o$. For convenience of reference we may now summarize our results:[5]

$$\begin{array}{llll} \alpha(oo) \angle o, & \alpha(oi) \angle o, & \alpha(io) \angle o, & \alpha(ii) \angle o, \\ \beta(oo) \angle o, & \beta(oi) \angle o, & \beta(io) \angle o, & \beta'(ii) \angle o, \\ \gamma'(oo) \angle o, & \gamma'(oi) \angle o, & \gamma(io) \angle o, & \gamma'(ii) \angle o, \\ \epsilon'(oo) \angle o, & \epsilon'(oi) \angle o, & \epsilon'(io) \angle o, & \epsilon(ii) \angle o. \end{array}$$

Let me in concluding add a word of reply in advance to those critics whose habit of thought will be sure to lead them to a misunderstanding of the possibilities that have just been pointed out. If two systems of inference contradict one another, they will say, then, if one be true, the other must be false. To this one must agree, but one might add that it may very well be meaningless to assert that either one is unconditionally true. The characteristic axiom of Riemannian space contradicts that of Euclidean space, but the "space of our experience" illustrates the one geometry quite as much as it illustrates the other. Two contradictory hypotheses can not both be true, because this is part of the meaning of their being contradictory, but each may well enough be applicable to one and the selfsame world. Surely pragmatic philosophy is directly served, whenever we can show that the world is plastic enough to illustrate two hypotheses indifferently, even when these two stand in direct contradiction to one another.

HENRY BRADFORD SMITH.

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SOCIETIES

AMERICAN PHILOSOPHICAL ASSOCIATION: PRELIMINARY MEETING OF LEADERS OF THE DISCUSSION ON MECHANISM VERSUS VITALISM

MEMBERS of the Philosophical Association are aware that at the Princeton meeting last December a new scheme was adopted for organizing pre-arranged discussions. The incoming Executive Committee was instructed to put the scheme into operation for the

[5] In the particular logic, whose foundations have just been set down, it will be found that the ordinary syllogism, $xy \angle z$, contains twenty-one valid moods; that $xy' \angle z'$ and $x'y \angle z'$ contain twenty-three and nineteen respectively, and that $xy \angle z'$ contains one hundred and fourteen. It will be found too that no other valid syllogistic variations exist except those just enumerated. The forms of inference built up out of α, β, γ and ϵ, which correspond to those of the common logic, have been fully treated in the writer's *Primer of Logic* (B. D. Smith and Bros., Pulaski, Va., 1917). A reference to that work will suggest the manner of working out the alternative systems proposed in this article.

meeting next December, and invited me to act as organizer of the leaders of the discussion. In consultation with our president (Professor Mary Whiton Calkins) and, through her, with the other members of the Committee, *Mechanism vs. Vitalism* was fixed on as the most promising topic for debate, and the following were chosen to form the group of leaders, *viz.*, Professor L. J. Henderson (Harvard University), representing Physics and Chemistry; Professor H. S. Jennings (Johns Hopkins University), representing Biology; Professor H. Warren (Princeton University), representing Psychology; and Professor W. T. Marvin (Rutgers College), representing, together with myself, Philosophy. It was thought desirable to invite the cooperation of three scientists, in order to have the different angles of approach to our problem represented as competently as possible. The thanks of the association are due to Professors Henderson, Jennings, and Warren, for their willingness to desert for this occasion the meetings of their own associations, and for their most helpful and loyal cooperation.

The preliminary meeting of leaders, called for by the new scheme, was held at Harvard University on June the twenty-first and twenty-second, between five and six hours on each of these two days being devoted to planning the general scope of the discussion and outlining the arguments which each leader will attempt to present at the discussion itself. A selected list of books and articles bearing on our topic will be published by us in the JOURNAL early in September. We have also agreed to submit our papers, in their final form, for publication during the fall, so that they may be in the hands of members of the association prior to the meeting. The drift of the discussion at our preliminary meeting made it appear desirable to frame our individual arguments on a common *basis of reference.* This basis of reference, which is submitted herewith to members of the association, together with brief abstracts of the proposed arguments of the leaders, attempts to exhibit the place of "mechanistic" concepts in the existing system of the Natural Sciences, and thus to define the general theoretical context within which the problem of the nature and status of "life," or rather of living beings, arises, and to which all attempts at a solution must be relevant. It should, however, be clearly understood that *this statement is strictly nothing but a basis of reference upon which our arguments can converge.* It is not put forward dogmatically, or even with complete unanimity, as a common doctrinal platform. On the contrary, although this statement was exhaustively discussed and its language shaped by all of us, we agreed that no one of us should be held committed to every detail of assertion that it contains, or every implication that ingen-

ious critics may read into its phrases. Indeed, there was nothing, perhaps, more clearly brought home to us than the difficulty of condensing into a brief statement this general background of our argument, so as to suggest nothing but the interpretations supplied by the context of our actual discussions, and in that context found acceptable with individual qualifications and reservations here and there. Hence each leader was left free to define, so far as he may think fit to do so, in his individual contribution, how far he accepts, or differs from, this basis of reference, and how his arguments bear upon it.

In general, I think, we all felt that this first part of the new scheme was an unqualified success. At least we were unanimous on having thoroughly enjoyed our discussion.

R. F. ALFRED HOERNLÉ.

BASIS OF REFERENCE

What follows attempts to be an objective statement of the present condition of science, bearing on the problem of Mechanism and Vitalism:

1. A geometrical description of the universe has been found applicable, without measurable imperfection, to all parts of the universe in so far as they occupy space. All material objects, all living bodies, are geometrical.

2. A kinematical description of the universe also has been found applicable, without measurable imperfection, to all parts of the universe which occupy space. This description involves time and motion as well as space. All material objects, all living bodies, are kinematic.

3. A mechanical description, involving the further concept of mass, also has been found applicable, without measurable imperfection, at least to all large masses. All large material objects, all large living bodies, are mechanical.

4. A physico-chemical description, involving such concepts as chemical composition, differentiation into phases, concentration, and every kind of potential, also has been found applicable, without measurable imperfection, in the preliminary survey of all molecular systems. All living bodies are molecular systems, or, in other words, are physico-chemical.

5. A description in geometrical, kinematical, mechanical, and physico-chemical terms may be called a *mechanistic* description.

6. The evidence in favor of the complete validity of the mechanistic description consists in its continuous development without any check, and in the fact that all quantitative measurements are consistent with such a description.

7. The discrimination of living bodies from other physico-chem-

ical systems rests upon certain common characteristics of the former class of systems. These characteristics are probably best described by the words organization and regulation.[1] It is true, however, that regulation, and perhaps also organization, can occur elsewhere. Living organisms may also be characterized by assigning the words function and teleology to their behavior or their constitution. They are, nevertheless, mechanistic through and through because they are physico-chemical systems, manifesting mechanical phenomena, kinematical phenomena, and geometrical characteristics.

8. The ascending scale from geometry to physical chemistry and on through the organic to what Spencer calls the super-organic is not to be regarded as a classification which has been worked out with complete success. Nevertheless, the several sciences involved include all the known kinds of natural phenomena, at least below the level of the organic, and perhaps below the level of mind. Moreover, the whole experience of science shows that these several departments of science are strictly additive and cumulative. The kinematical is the geometrical plus something else. The mechanical is the kinematical plus something else, and so on. There is much room for difference of opinion whether these successive increments are homogeneous or heterogeneous. But this is probably a matter of definition or of scale. What is important is the vast induction that they involve only addition.

Abstract of Paper by Professor Henderson

A decision between mechanism and vitalism, regarded as mutually exclusive interpretations of living things, is not at present possible. On the one hand it may be truly said that mechanism has never been proved wrong and gains ground steadily. But the reply to this is that the very types of phenomena, *e. g.*, those possessing singularities of various kinds, catalytic actions, *etc.*, which to the physical scientist appear to be the only conceivable sphere for true *vitalism*, are not yet well investigated. Scientifically, therefore, the evidence for mechanism amounts to a strong probability, weakened by the fact that some of the important cases have not been settled.

Logically, I incline to the opinion that all statements of strictly anti-mechanistic vitalism are meaningless. Especially am I convinced that such views as those of Boussinesq, Charles Peirce, J. S. Haldane and others, which seek to add something heterogeneous to mechanism, or to abandon it by rising to a higher level, in effect destroy our only means of thinking about physical phenomena.

Upon the other hand, I agree with Haldane that it is hardly pos-

[1] The addition of growth, reproduction, nutrition was suggested by one member.

sible to overemphasize the importance of organization as a qualification of all bio-physics and bio-chemistry.

Abstract of Paper by Professor H. S. Jennings

(A discussion of the practise and progress of biological science in relation to the above formulation of the status of general science as bearing on the problems of mechanism and vitalism.)

The relatively incomplete formulations given by biological science at its present stage of development would yield, taken by themselves, only fragments of the various kinds of scientific description set forth as existent, in the general statement. Therefore the discussion centers about those underlying relations in the perceptual phenomena which make scientific formulation possible. These relations may be characterized as the prevalence of *experimental determinism;* they lie in the fact that all perceptual phenomena are so interconnected that when one is experimentally altered, certain others are likewise altered. Temporally these relations manifest themselves in the fact that all later perceptual diversities in systems are experimentally determined by earlier perceptual diversities in the systems. The correspondences of diversities are found to fall into a system which constitutes the various types of scientific "descriptions" set forth in the general statement.

The progress of examination indicates that such experimental determinism holds rigorously throughout the living. No case is known of perceptual diversity that is not experimentally determined by a preceding perceptual diversity. In opposition to theories of vitalism that maintain experimental indeterminism (Driesch), this applies notably to regulatory processes in development; to adaptive or purposive actions in general; and to the diversities in the phenomena commonly called "states of consciousness." Experimentally, the latter are bound up with objectively perceptual diversities, preceding and succeeding, as are other phenomena.

These relationships make possible in the science of the living the same general type of formulation as in the science of the non-living. They leave no place for non-perceptual determiners of perceptual events, save as assumed accompaniments to the perceptual determiners.

But the conditions in biology do not imply the deducibility of all biological phenomena from any general proposition or set of such; do not imply that biological phenomena are theoretically predictable from a complete knowledge of any part, or the whole, of the non-living. They do not imply even that the motions and configurations of the living are essentially predictable from a knowledge of the mo-

tions and configurations and their laws of change in the non-living. So far as biological experimentation goes it is possible that the laws of motion drawn from a study of the non-living are not complete, but require essential additions from the study of the living. In particular it is not impossible that special laws become manifest when there is "consciousness" in its various types. This involves no breach of objective experimental determinism, the diversities of consciousness being conditioned by diversities in objective perceptual conditions (configurations not found in the non-living).

It is consistent with the complete experimental formulation of biological science that types of phenomena should occur in the living that do not occur in the non-living (the production of asymmetrical crystals?; the occurrence of objects combining typical forms with changing chemical constitution?; non-obedience to the second law of thermodynamics?; the occurrence of consciousness?, *etc.*) All these are questions of fact, not altering the general type of formulation of the science, in accordance with experimental determinism.

ABSTRACT OF PAPER BY PROFESSOR H. C. WARREN

1. Professor Henderson's formulation is thoroughly acceptable to me, with the exception of Article VII., which seems in certain respects inadequate or at least not sufficiently explicit. I would restate this article as follows:

VII. The discrimination of living bodies from other physico-chemical systems rests upon certain common characteristics of the former class of systems. These characteristics are probably best described by the terms *organization, nutrition, growth, regulation, repair,* and *reproduction.* It is true that each of these characteristics may occur elsewhere. Their combination, however, which results in the maintenance of individuals for a long period, and of the class of living systems for an indefinitely long epoch, may at present be regarded as the specific characteristic of living bodies. Living bodies may also be characterized by assigning the adjectives *functional, responsive, retentive,* and *anticipatory* to their behavior or to their constitution. They are nevertheless mechanistic through and through, because they are physico-chemical systems, manifesting mechanical phenomena, kinetical phenomena, and geometrical characteristics.

2. It should be noted that the antithesis between mechanism and vitalism is really not complete: (*a*) One might accept the notion of mechanism as defined in these articles and at the same time describe the phenomena of living bodies in terms of a specific *vital force*—that is, a specific mode of activity different from physico-chemical activity. According to this view a living body is a *vital mechanism,* belonging to a higher additive level than physico-chemical mechanism.

(*b*) On the other hand, if the behavior of living bodies is conceived to be in any respect indeterminate (or determined by an entelechy, psyche, or other agent distinct from the activity itself),

this class of systems falls outside the sphere of mechanism. But the same is true of non-living bodies also. According to the ancients not only vital phenomena, but many physical and chemical phenomena also, are non-mechanistic.

3. One line of argument often used in support of vital indeterminism or entelechism is based upon the analogy of human consciousness and volition, which are assumed to be autonomous and non-mechanistic. Accordingly my paper will examine the nature of those human activities which are generally designated as *conscious* and *voluntary,* with special reference to their supposed indeterminateness.

The standpoint of the paper is that according to the weight of present evidence (1) *all human activity, including deliberation and selective volition, is completely mechanistic;* and (2) *this mechanism is physico-chemical in type.* While certain phases of human activity are found to be far more intricate than any other known physico-chemical mechanism, this is due to the tremendous complexity of the phenomena, not to their novelty. Psychology, thus interpreted, affords no support to vitalism or to indeterminism.

4. Living bodies (organisms), whether regarded as conscious or not, (*a*) are able to act upon data from *past* and *future,* and upon data from *afar,* as well as upon present, contiguous data. Moreover, (*b*) their responses to stimuli tend in general to be *suitable,* or *fit.* Taking into account these two characteristics, the behavior and structure of organisms may be called *teleological.*

The paper will maintain that according to present evidence (3) *the teleological character of organisms is completely mechanistic and physico-chemical.* There is at present no adequate ground for assuming the activity of a specific vital force or entelechy, or for assuming any indeterminateness in the growth activities or behavior activities of organisms.

Abstract of Paper by Professor W. T. Marvin

The issue between physico-chemical mechanism and vitalism is not one of facts (phenomena, or observed data), but of theories (or explanations). It is essentially philosophical and is part of a more general philosophical issue. On the one hand is the philosophy of modern science going back at least to Galileo, on the other hand is romanticism.

The former is manifested in the following scientific attitudes, or prejudices.

1. Though several (or even many) independent postulates form the basis of science and though many indefinable notions form the

basis of definition of the remaining concepts of science, still these all should be reduced to a minimum. These postulates and notions are mathematical, physical, and chemical, and perhaps the last may be reduced to the physical. In these postulates we have the sufficient conditions for the remainder of science and in this sense science is logically continuous.

2. Second is the prejudice of determinism. All facts have their sufficient conditions, that is to say, can be explained. Diverse events, properties, or effects always presuppose diverse conditions, structures, or antecedents.

3. Though the facts of life and of mind constitute an extremely complex and difficult array of data to be explained adequately or completely by the logically prior sciences, still our persisting inability so to explain them is due not to the facts themselves, but to our ignorance and imperfect experimental technic. No fact has thus far been shown to be either inconsistent with physico-chemical science or inexplicable by this science. Rather continued successes have met experimental research (especially since the early nineteenth century) in explaining many vital and mental facts mechanistically.

4. The admitted novel facts of life and of mind or combinations of facts are to be explained as the consequences of higher levels of organization; for organization both in the field of the lifeless and in the field of the living exhibits properties not present in the elements or members of the organized system. Hence it is believed that organization without the assumption of further postulates will explain both life and mind.

5. However, it may be true that there are genuinely discontinuous facts exhibited by these organizations, such as the sensory data of minds, but these discontinuous, or inexplicable facts are always in one to one correspondence with configurations of the organized system and these configurations can be explained mechanistically. That is, we have to admit that the majority of scientists during the past three centuries have found in mental states facts logically discontinuous with physics. Hence in psychology have appeared such postulates as parallelism, the double aspect theory, and interactionism. Still there have also been scientists hopeful enough to believe that science may in time analyze these discontinuous facts and find no break in the logical continuity of science. If there are such discontinuous facts there seems to be no reason to assume that they are to be found only in the fields of consciousness, although scientific tradition seems to place them all there.

6. The remarkable traits of life and of mind, such as chemical auto-synthesis, adaptation, regulation, and in general the functional

and teleological traits are the consequences of natural selection, or equilibrium, and presuppose the same postulates that explain equilibria in the field of the lifeless.

In contrast with mechanism, vitalism exhibits the following traits.

1. It is deeply impressed with the variety, diversity, and uniqueness of the facts of life and of mind. It finds in science a gross oversimplification of these facts or even a blindness to many of them.

2. It is more primitive than science. It is a persisting animism coming from our remote past, "a call of the wild."

3. It has a religious motive. The world would seem more in tune with the heart of man, life would seem more mysterious and venturesome, if both were inexplicable, or if both contained creative agents, teleological agents, and genuine spontaneity.

In my paper I shall try to show that in our present ignorance the best method of meeting the issue raised is the pragmatic.

1. Lived up to consistently, romanticism is a return to savagedom. Civilization presupposes skill and explanation. It presupposes that man can understand and control himself and his environment.

2. Science depends upon experimental research and this in turn presupposes that diverse events, properties, or effects always presuppose diverse discoverable conditions. Vitalism seems to deny this; for it seems to assert that agents or factors are present that by hypothesis can not be analyzed, that have no structure, and that possess powers which are genuinely creative (powers that are inconsistent with the principles of thermodynamics).

3. Romanticism and in particular vitalism seem to be symptoms of discouragement and fatigue. Vitalism is ready to quit, to declare the enterprise of explaining life and mind by theories consistent with physico-chemism impossible, and is not hopeful enough to ascribe our present inability to ignorance.

4. Vitalism is, however, pragmatically valuable in its extreme empiricism. It warns us against overlooking facts, against rash and premature simplification of facts, and against blindness to the novelty, uniqueness, complexity, and teleology of life and mind.

In conclusion I would add that I agree with Professor Henderson's statement of physico-chemical mechanism and prefer Professor Warren's restatement of paragraph 7, though the more general wording of Professor Henderson may be advisable.

Abstract of Paper by Professor R. F. A. Hoernlé

In the course of the argument which I hope to contribute to the discussion, it is, at present, my intention to deal with the following points:

1. Our basis of reference seems to me to afford a good opening for discussing how far, and in what sense, a *unified* theory of the universe is possible. As against the two extreme views (*a*) that such unification must be achieved exclusively in mechanistic terms, or (*b*) that, failing this, we must admit absolute discontinuities in the scheme of things, I shall try to argue for unification by correlation of differences—a concept of the universe as, so to speak, a stratified system, implying an order, in which differences may be correlated with, but can not be dissolved into, each other.

2. On this basis, therefore, it will be possible to argue (*a*) for the "autonomy of life," *i. e.*, of the characteristic concepts which biology needs in order to give an adequate theory of the living as distinct from the non-living; (*b*) for mechanical and biological concepts as complementary and "cumulative," not as mutually exclusive. I accept the view that the phenomena of life rest on physico-chemical mechanisms, but I insist that they must also be dealt with *in their own terms,* and that we should not regard it as the ideal of science some day to be able to discard, *e. g.*, the terms appropriate to the theory of animal or human behavior in favor of an account expressed exclusively in terms of physico-chemical formulæ. This recognition of the "autonomy of life," which seems to me the empirical truth in Vitalism, does not, I think, necessitate the concepts of a specific vital force, or vital energy, or Drieschian entelechy.

3. It does, however, raise the problem of the sense in which teleological concepts are applicable. To eliminate from biology the concept of purpose, so as to retain solely the concept of cause and effect, involves, I shall try to argue, an undeniable loss. My argument will require (*a*) a brief analysis of the concepts of determinism and causality, especially as employed in experimental research; (*b*) the attempt to establish a sense of "purpose" which does not imply conscious design, still less a designer, after the manner of the old physico-theological proof. A comparison of machines in the strict sense, *i. e.*, man-made artefacts, and living organisms will here be found relevant, and throw light on the general relation of mechanical to teleological concepts.

REVIEWS AND ABSTRACTS OF LITERATURE

Applied Psychology. H. L. Hollingworth and A. T. Poffenberger. New York and London: D. Appleton and Company. 1917. Pp. xiii + 337.

Psychology has indeed become a subject of great and widespread interest to-day to the popular mind. An increasing number of peo-

ple are desirous of making a real application of it to the actual affairs and problems of daily life. Naturally they look to the experience and instruction of our schools of psychology to teach them how this is to be done. Naturally also they cherish a hope of great things which are to be accomplished to make the struggle for existence more effective and less burdensome. In how far are the schools equal to their opportunity?

The present volume is an attempt to set forth concisely but comprehensively the plane of advance which applied psychology has reached, the principles of psychology and the psychological facts upon which it bases itself, and then its contact with various departments and activities of modern life. The behavior of man forms the objective starting point for such a psychological approach to these practical concerns and to the psychical factors underlying it. This involves the discussion of the general principles of behavior, the elements which go to make up this behavior, that is the acquisition of elements through inheritance and individual experience, and finally the ways by which behavior may in any situation be controlled.

A brief review of the history of applied psychology notes the vague psychological interest in the workings of the mind upon daily problems which has always occupied even popular thought, the early attempt to transfer methods and findings from the psychological laboratory into other fields, with later the interest in studying actual daily material of practical life in which experiments are carried on. These, however, the authors complain, still fail to take sufficient account of the human factor as it actually exists in relation to the practical subjects in hand. This is a problem of great complication and under the influence of many factors. Furthermore, as is pointed out, psychology has properly to do with the means to an end, not with any judgment concerning the end itself.

Such being the outline of the book, the authors discuss some of these factors which must be taken into consideration. First of these is heredity, which is manifest in somatic reflex activities, in instincts, which are enumerated as part of original equipment, physical inheritance, as confined to family likenesses, where mental inheritance also manifests itself. The modification of inherited traits, particularly in original tendencies to action, is also the subject largely of experimental study especially as revealed in the process of learning by trial and error, choice of efficient movements and elimination of those which hinder efficiency and skill, the influence in this of pleasure and dissatisfaction, the use of memory, proper distribution of time and effort and the presence of an intention or "will to learn."

Whether these processes are influenced by age or sex, how far

environmental conditions, such as temperature and humidity, play a rôle in learning and efficiency, the condition of fatigue, its meaning, its control and regulation and the importance of considering its influence, these are all set forth as they broaden the field for psychological investigation and touch the application of it to industrial and other practical affairs. Some experiments have also been made in regard to various drugs and stimulants and their effect upon the mental processes, as they are observed in the laboratory or in practical life.

The methods of applying psychology to social problems depend first on an analytic attitude toward the materials and tasks in hand, and then must utilize the knowledge of material and processes acquired employing the psychological technique. The authors then go on to show how this can be utilized in the executive management of industrial affairs, in the activity of the workman himself and the reaching of the public as the market of supply. Further the same principles apply to law, medicine and education.

The chief criticism to be directed against the book is that which refers to this laboratory effort of psychology as a whole. The writers themselves have felt it and anticipated it when they refer now and then to the lack of attention to the human equation. How far this latter lifts every one of these problems out of the realm of mechanically tested facts and sets them far beyond evaluation and control through merely static measurements and conclusions even they fail to appreciate. It is just this larger factor that separates psychology inevitably from the more exact sciences, even as biology itself is rendered elusive, fluctuating, to some extent unpredictable, because it deals with living substances in a state of constant flux. Even more psychology, properly to fulfil its task and reach results which actually affect human processes, must keep itself in appreciative touch with such an inherent dynamism, of far greater extent in the mental life, and ever on the alert for the surprise and the unpredictability of the human element.

Yet, even as laws are discoverable in the biological realm, so does mental life itself express lawful activities which have formed themselves out of the mass of experiences which organic beings, in the end human beings, have accumulated to themselves through eons of psychic experiences. Such a gentic view of the subject shows at once how futile is then the application of such limited laws as appear in behavior considered from the point of view of immediate consciousness, which can be expressed only in superficial measurements. The authors hint more than once of factors out of past inheritance. Every one must, of course, admit them. Why, then. do they not follow them up; why does not the science of psychology, if it will

make itself truly applicable to daily living and occupation, take these into account as vital, dynamic factors giving to behavior its set and its motive power?

The chapter on influence of drugs is plain in its testimony to the influence of the individual mode of response, individual adaptation to any environmental factor in the service of purpose and use, which so modifies the effect of that factor that static conclusions are rendered valueless. It is a matter of informing interest within to which too little attention is paid. Plasticity and pliability of adaptation are the most efficient characteristics of living matter and have developed with evolution to give the human race its ascendancy. They are controlled and governed by interest and through it they give to the individual his efficiency or, wrongly directed, condition his failure. Here, then, is the effective factor in all psychological application, whether to business, education, medicine or what not. Why, if there is interest, it may be asked, can we then speak of its failing? This is one of the neglected points of laboratory psychology. There is an unyielding tendency in psychologists, as in the rest of mankind, to refuse to recognize and admit all the channels of this interest. Culture, as well as the practical affairs of life, have been too intent upon attaining momentary efficiency and security, to stop to consider from where such efficiency came, to recognize other concealed interests which also play continually upon external interests and too often distract and confuse. Conceiving interest, however, as merely an expression for the value of an energy, indestructible and therefore only transposable, in the purposes of life, it can be seen that interest may be in the task in hand or it may have retreated to other secret occupations.

Psychology's task, therefore, becomes much more human, much deeper and broader, even in fitting the telegrapher to his task, when the dynamic possibilities within any individual, psychology's material, are realized. It means more emphasis laid upon the human being as a sum of such active, constantly playing factors, in the terms of an easily shiftable and transmutable energy. It means the finding and following of a controlling interest sufficiently motivated from the great impulses alive in every human being and individually accentuated according to that individual's peculiar circumstances and inheritance. The realization of the power of human purpose and the need and possibility of its guidance and control through enlistment of distracting forms of interest, which are also naturally present, into some main channel of efficiency, this is the practical implement of service in the hands of the experimental psychologist. Tests of response to certain environmental factors, such as those listed here, may aid to a certain extent if the larger view is kept

in mind, but they are disappointingly futile and limited in themselves for reaching human dynamic possibilities and directing them upon work or the solving of problems. Like intellectual so-called "mental tests" they take small account of factors actually and always at work. The latter can at best form but a limited initial stage to deeper research into controlling affective factors, upon which even intellect rests. In regard to environmental conditions, they have always been, and nowhere more than in present war conditions do they show themselves such, sources of stimuli and endeavor far more than forces themselves in control of the individual.

The aim of this book is as the first gleaming of light in the right direction. More than other works on applied psychology it points to a gathering together of all the elements which make up human psychical life for the psychologist's consideration. Nevertheless, it is only barely suggestive. Certain spheres to which it briefly refers could perhaps throw the flame much further could experimental psychologists grasp more fully the psychical unity in human society. Then, for example, child psychology would reveal these same dynamic elements at work in earlier stages, animal psychology would more effectually than now accomplish the same thing and so would anthropological psychology, in still another plane. Then also medical psychology would not be viewed even yet somewhat askance as dealing with a separated class of individuals. Inefficiency to construct a taking advertisement for subway publicity would be viewed as but one phase and a hysterical illness as another of an inffectualness to meet the particular task in hand which life demanded, and the largely unconscious attempt on the part of either individual to substitute other interests, and the reactions which furthered them, for the interest demanded by the task or mode of life in hand. Disease and inefficiency used as synonymous terms have much light to throw upon each other, and though they may represent widely different degrees yet they are expressions of the same form of reaction. An inquiring active public will welcome all effectual effort to discover and control the factors of human behavior, of human psychical activity, but let it go deep enough and itself show sufficient breadth and plasticity to effect its ends with the adaptable material with which it has to do.

SMITH ELY JELLIFFE.

NEW YORK CITY.

JOURNALS AND NEW BOOKS

THE AMERICAN JOURNAL OF PSYCHOLOGY. January, 1918. *Manaism: A Study in the Psychology of Religion* (1–49): IVY G. CAMPBELL.—*Mana* is conceived as a great personal spiritual power rising out of the social experiences of the interpreters. *Mana* arising from the social self is objectified and worshipped and regarded greater than the individual. Religion then becomes an attitude toward objectified qualities that were personal experiences. Bibliography. *French Origins of American Transcendentalism* (pp. 50–65): ALBERT SCHINZ.—The French influence has been greater on American thought than expected, while the German influence is usually exaggerated. This is especially true of American Transcendentalism. Dr. Girard, a former student of theology in French Switzerland, makes a clear case of the predominating influence of French writers. (This is a discussion of the origin of the theological and philosophical ideas in American Transcendentalism in the *Journal of Psychology.*) *Ethical Aspects of Chilkat Culture* (pp. 66–80): W. D. WALLIS.—The Chilkat tribe belongs to the Tlingit linguistic group and lives at the head of Lynn canal, north of Dixon entrance, Alaska. They have social classes or castes, keep a few slaves, family organization with the maternal side emphasized, and educate by story and tradition. Boys and girls are treated kindly. *A Qualitative and Quantitative Study of Weber's Illusion* (pp. 81–119): MABEL ENSWORTH GOUDGE.—Twenty-four regions of the body were explored. The illusion occurred more frequently in the longitudinal than in the transverse direction. *A Checking Table for the Method of Constant Stimuli* (pp. 120–121): GILBERT J. RICH. *Note.—Dr. Morgan on the Measurement of Attention* (pp. 122–123): K. M. DELLENBACH. *Book Notes.* H. L. Hollingworth and A. T. Poffenberger, *The Sense of Taste.* Henry Fairfield Osborn, *The Origin and Evolution of Life, On the Theory of Action, Reaction, and Interaction of Energy.* William Mackintire Salter, *Nietzsche, the Thinker; A Study.* Tighe Hopkins, *The Romance of Escapes: Studies of Some Historic Flights, with a Personal Commentary.* T. R. Glover, *The Jesus of History.* Henry Burton Sharman, *Records of the Life of Jesus; Book I, The Record of Matt.-Mark-Luke; Book II, The Record of John.* Kate Gordon, *Educational Psychology.* Seth K. Humphrey, *Mankind; Racial Values and the Racial Prospect.* Marion F. Bridie, *An Introduction to Special School Work.* Frank N. Freeman, *How Children Learn.* Charles Hubbard Judd, *Psychology; General Introduction.* Jean Lepine, *Troubles mentaux de guerre.* George Albert Coe, *A Social Theory of Religious Edu-*

cation. M. D. Eder, *War-shock; The Psycho-neuroses in War Psychology and Treatment.* Francis X. Dercum, *Rest, Suggestion, and Other Therapeutic Measures in Nervous and Mental Diseases.* H. Addington Bruce, *Handicaps of Childhood.* George W. Carey, *The Tree of Life: An Exposé of Physical Regenesis on the Three-fold Plane of Bodily, Chemical and Spiritual Operation.* Elizabeth Lockwood Thompson, *An Analysis of the Learning Process in the Snail.* Joseph Peterson, *The Effect of Length of Blind Alleys on Maze Learning; an Experiment on Twenty-four White Rats.* Agostino Gemelli, *Sull' Applicazione dei metodi psicopfisci All'esame dei candidati all'aviazione militare.* Charles Hanson Towne, *The Balfour Visit.* John J. B. Morgan, *The Speed and Accuracy of Motor Adjustments.* H. C. McComas, *Apparatus for Recording Continuous Discrimination Reactions.* David I. Macht and Shachne Isaacs, *Action of Some Opium Alkaloids on the Psychological Reaction Time.* Julian Restrepo-Hernandez, *Lecciones de Antropologia.* Orison Swett Marden, *How to Get What You Want.* June E. Downey, *The Association Test as a Substitute for the Quiz.* June E. Downey, *The Stanford Adult Intelligence Tests.*

REVUE PHILOSOPHIQUE, February, 1918. *Convergences des développements linguistiques* (pp. 97–110): A. MEILLET. – In the development of related languages we find "parallelism of changes of general structure, divergence of innovations having to do with the material means of expression." In true internal linguistic changes we find that "the innovations are general rather than generalized, and that the identity or parity of conditions in which the speaking subjects are found is the essential fact, imitation a secondary thing." *Les fondements d'une théorie de l'hérédité* (pp. 111–147): E. RABAUD. – "The plastic substances which form the diverse living matters do not conserve, once they have been associated, their complete independence. They form complex systems in which each component submits necessarily to the influence of the others. When, in developing, one of the systems gives birth to an organism, its parts do not spring each from a particular component; all derive from the group of phenomena of which the system is the seat." *Études de logique comparée* (third and last article; pp. 148–166): P. MASSON-OURSEL. – A trait common to the Indian, Chinese and European civilizations is that "the logical effort is manifested through a sophistical movement and terminates in a scholasticism." The comparative analysis puts into evidence the relativity of logical ideas and shows that the current definitions of logic are not satisfactory. "Logical problems, instead of being formulated *a priori* in pure reason, as prejudicial conditions of every speculative verity, are presented only

in connection with the given theoretical needs of a civilization, and are resolved only by an implicit application of current metaphysical doctrines. Their form corresponds to these needs, their matter reflects these doctrines. Formal logic is only an abstract of the metaphysical logic, and this latter derives, at bottom, from that virtual logic into which the spontaneous steps characteristic of the spirit of a people are ingeniously translated." *Analyses et Comptes rendus.* Gaston Richard, *La question sociale et le mouvement philosophique au XIX siècle:* ÉMILE BRÉHIER. *Studies in Psychology (in honor of Titchener)*: B. BOURDON. *Revue des Périodiques.*

PSYCHOLOGICAL BULLETIN. December, 1917. GENERAL REVIEWS AND SUMMARIES: *Psychological Effects of Drugs:* A. T. POFFENBERGER, JR. *Reaction Time:* V. A. C. HENMON. SPECIAL REVIEWS: Dunlap's *Psychobiology;* Gerrish's *Sex Hygiene;* Robie's *Sex Ethics;* S. I. Franz. REPORT: *Report of the Committee on Reeducation Research.* BOOKS RECEIVED. NOTES AND NEWS. PUBLISHER'S Announcement: Owing to the number of psychologists engaged in government work, and the consequent decrease in psychological investigations, it has been decided to suspend temporarily the publication of the *Journal of Experimental Psychology.* The publication will be resumed as soon as conditions warrant. Meanwhile the experimental material will be published in the *Psychological Review. Indexes.*

Smith, Norman Kemp. A Commentary to Kant's 'Critique of Pure Reason'. London: Macmillan and Company. 1918. Pp. lxi + 615. $6.00.

NOTES AND NEWS

The Argentine weekly, *El Universitario,* has sought to obtain by means of a questionnaire an expression of opinion as to which are the one hundred best Argentine books. In reporting the result, the titles have been classified in ten groups and ten books noted in each group, but five books receiving many votes have been added to the ten of each group. The *Revista de Filosofia,* from which we take the following list, observes that the list is decidedly better than what is usually to be expected from such inquiries, but expresses surprise that the drama is unrepresented, a field, to be sure, usually not available in book form. In the groups of fifteen titles that follow, the last five of each group are much esteemed, but not so much as to be listed among the favored ten. Such a bibliography of Argentine literature should be at the service of all friends of South American culture.

Diez Libros de Historia.—Vincente F. López, "Historia Argentina"; Paul Groussac, "Mendoza y Garay"; Bartolomé Mitre, "Historia de Belgrano"; Bartolomé Mitre, "Historia de San Martin"; José M. Paz, "Memorias"; Adolfo Saldías, "Historia de la Confederación"; José M. Ramos Mejía, "Rosas y su tiempo"; Martín Ruiz Moreno, "Hist. de la Organización Nacional"; Paul Groussac, "Liniers"; José Manuel Estrada, "Historia Argentina"; Han sido muy indicados los siguientes: Francisco Ramos Mejía, "El Federalismo Argentino"; Mariano A. Pelliza, "Historia Argentina"; Gregorio Funes, "Historia Argentina"; Benjamín Victorica, "Urquiza y Mitre"; Carlos Correa Luna, "Don Baltasar de Arandia."

Diez Libros de Prosa Literaria.—Domingo F. Sarmiento, "Facundo"; Paul Groussac, "Del Plata al Niágara"; Miguel Cané, "Juvenilia"; Eduardo Wilde, "Aguas Abajo"; Joaquín V. González, "Mis montañas"; Domingo F. Sarmiento, "Recuerdos de Provincia"; L. V. Mansilla, "Los indios Ranqueles"; Leopoldo Lugones, "Guerra Gaucha"; Angel Estrada "El color y la piedra"; Belisario Roldán, "Discursos." Han sido muy indicados los siguientes: Miguel Cané, "Notas e impresiones"; Ricardo Rojas, "El país de la selva"; Lucio V. López, "Recuerdos de viaje"; Nicolás Avellaneda, "Escritos literarios"; Leopoldo Lugones, "Prometeo."

Diez Libros de Poesia.—Olegario V. Andrade, "Poesías"; José Hernández, "Martín Fierro"; Esteban Echeverría, "La Cautiva"; Almafuerte, "Poesías"; Rafael Obligado, "Poesías"; Leopoldo Lugones, "Las Montañas del oro"; Calixto Oyuela, "Cantos"; Ricardo Gutiérrez, "Poemas"; Hilario Ascasubi, "Santos Vega"; Juan Cruz Varela, "Poesías." Han sido muy indicados los siguientes: Estanislao del Campo, "Fausto"; Carlos Encina, "Poesías"; Enrique Banchs, "Poesías"; Evaristo Carriego, "Poesías"; José Mármol, "Armonías."

Diez Libros de Politica.—Juan B. Alberdi, "Bases"; Juan B. Alberdi, "Derecho Público Provincial"; Juan B. Alberdi, "Sistema económico y rentístico"; Esteban Echeverría, "Dogma socialista"; Augustín Alvarez, "Adonde vamos"; José Nicolás Matienzo, "El sistema representativo federal"; Agustín de Vedia, "La Constitución Argentina"; Joaquín V. González, "Política espiritual"; Rodolfo Rivarola, "Del régimen federativo al unitario"; Mariano Moreno, "Escritos." Han sido muy indicados los siguientes: Agustín Alvarez, "Manual de Patología política"; Martín García Mérou, "Ensayo sobre Alberdi"; Ricardo Rojas, "La Argentinidad"; Bernardo de Monteagudo, "Escrites políticos"; Julio Costa, "El presidente."

Diez Libros de Sociologia.—Juan Agustín García, "La Ciudad Indiana"; Juan B. Alberdi, "Estudios económicos"; Carlos O. Bunge, "Neustra América"; José Ingenieros, "Sociología Argentina"; José M. Ramos Mejía, "Las Multitudes Argentinas"; Ernesto Quesada, "La época de Rosas"; Alfredo Colmo, "América Latina"; Lucas Ayarragaray, "La anarquía argentina"; Leopoldo Maupas, "Caracteres de la sociología"; Juan Agustín García, "Ciencias sociales argentinas." Han sido muy indicados los siguientes: Raul Orgaz, "Estudios de sociología"; Ricardo Levene, "Orígenes de democracia argentina"; Domingo F. Sarmiento, "Conflicto y armonía de las razas"; Juan Alvarez, "Guerras civiles argentinas"; Joaquín V. González, "Ley Nacional del Trabajo."

Diez Libros de Ciencias.—Florentino Ameghino, "Filogenia"; Florentino Ameghino, "Antigüedad del hombre en el Plata"; Germán Burmeister, "Descripción de la Rep. Argentina"; Valentín Balbín, "Cálculo de los cuaterniones"; Eduardo L. Holmberg, "Carlos Roberto Darwin"; Florentino Ameghino, "Doctrinas y descubrimientos"; Benjamín A. Gould, "Uranometría

argentina''; Julio Méndez, ''Teoría de la inmunidad''; Félix Outes, ''La edad de piedra en Patagonia''; Francisco de Veyga, ''Estudios médico-legales.'' Han sido muy indicados los siguientes: Juan Vucetich, ''Dactiloscopia''; José M. Ramos Mejía, ''Neurosis de los hombres célebres''; Angel H. Roffo, ''Estudios sobre el cáncer''; José Ingenieros, ''Criminología''; Florentino Ameghino, ''Las formaciones sedimentarias.''

Diez Libros de Educación.—Domingo F. Sarmiento, ''Educación popular''; Carlos Octavio Bunge, ''La Educación''; Victor Mercante, ''Metodología''; Juan P. Ramos, ''Historia de la instruc. primaria''; Rodolfo Senet, ''Evolución y Educación''; Ricardo Rojas, ''La Restauración nacionalista''; Agustín Alvarez, ''Educacíon moral''; Raquel Camaña, ''Pedagogía social''; Víctor Mercante, ''La aptitud matemática''; Amancio Alcorta, ''La instrucción secundaria.'' Han sido muy indicados los siguientes: Rodolfo Rivarola, ''El maestro J. M. Estrada''; Domingo F. Sarmiento, ''La Escuela Ultrapampeana''; Juan M. Gutiérrez, ''Origen y desarrollo de la enseñanza''; Vicente G. Quesada, ''Vida intelectual en Hispano-América''; Leopoldo Lugones, ''Didáctica.''

Diez Novelas.—José Mármol, ''Amalia''; Vicente F. López, ''La novia del hereje''; Eduardo Gutiérrez, ''Juan Moreira''; Lucio V. López, ''La gran aldea''; Enrique Larreta, ''La gloria de Don Ramiro''; Eugenio Cambaceres, ''Sin rumbo''; Eduardo Holmberg, ''La bolsa de huesos''; Julián Martel, ''La Bolsa''; Hugo Wast, ''Flor de Durazno''; Eduardo Gutiérrez, ''Santos Vega.'' Han sido muy indicados los siguientes: Ema de la Barra, ''Mecha Iturbe''; Ema de la Barra, ''Stella''; Manuel Gálvez, ''La maestra normal''; Godofredo Daireaux, ''Las dos patrias''; Anónimo, ''Los amores de Giacumina.''

Diez Libros de Derecho.—Dalmacio Vélez Sársfield, ''Código Civil''; Carlos Calvo, ''Derecho Internacional''; Carlos Octavio Bunge, ''Historia del Derecho Argentino''; Luis M. Drago, ''Cobro coercitivo de las deudas''; Estanislao Zeballos, ''La nacionalidad''; José Nicolás Matienzo, ''Lecc. de Derecho Constitucional''; Ernesto Quesada, ''La propiedad intelectual''; Rodolfo Rivarola, ''Derecho Penal Argentino''; Aristóbulo del Valle, ''Derecho constitucional''; Joaquín V. González, ''Manual de la Constitución.'' Han sido muy indicados siguientes: J. B. Alberdi, ''El crimen de la guerra''; Cornelio Moyano Gacitúa, ''La delincuencia argentina''; Carlos Octavio Bunge, ''El derecho''; Enrique Martínez Paz, ''Ensayo sobre Vélez Sársfield''; Antonio Dellepiane, ''Las causas del delito.''

Diez Libros de Ciencias Morales.—José Ingenieros, ''El hombre mediocre''; José M. Ramos Mejía, ''La locura en la historia''; Clemente D. Ricci, ''Los orígenes del cristianismo''; Matías Calandrelli, ''Diccionario Filológico''; Agustín Alvarez, ''La creación del mundo moral''; José Ingenieros, ''Principios de psicología''; Carlos Olivera, ''El Divorcio''; Alejo Peyret, ''Historia de las religiones''; Carlos D. Vergara, ''Fundamentos de la moral''; Augusto Bunge, ''El culto de la vida.'' Han sido muy indicados los siguientes: J. B. Alberdi, ''Luz del día''; J. M. Fernández de Agüero, ''Principios de ideología''; Rodolfo Rivarola, ''Fernando en el colegio''; Juan B. Ambrosetti, ''Leyendas y supersticiones''; Facundo de Zuviría, ''Escritos morales.''

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